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DISCOUNT PRICING PROGRAMS IN TELECOMMUNICATIONS:  
THE U.S. EXPERIENCE

COMMUNICATIONS DIVISION  
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## PREFACE

One of the major issues facing the Canadian telephone industry currently is that of "rate rebalancing" or rate restructuring. This issue refers to a restructuring of telephone rates whereby long distance would generally be lowered and local rates would generally be increased.

The purpose of this study was to examine discount pricing to determine if its effective use could stimulate overall revenues. Revenue increases would reduce any pressure on local rates that may arise as a result of decisions taken with regard to the issue of rate restructuring. Preparation for this project began in July of 1985 and involved interviews and meetings with U.S. telecommunications officials, which were conducted in a two week period beginning in September 1985. Interviews were conducted with six U.S. Public Utility Commissions including the Federal Communications Commission, five telephone companies and five Consumer Protection Groups. These interviews were extremely beneficial, and provided the opportunity to learn about discount programs first hand.

The U.S. telecommunications officials were interviewed and provided valuable comments and literature. Their names and organizations are listed in Appendix A.

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## EXECUTIVE SUMMARY

The principal objective of this study was to better understand the experiences other jurisdictions have had with discount pricing programs in telecommunications. Research was needed on programs where promotional pricing is employed to increase the calling load in off-peak periods which at same time increases overall revenues. In particular, we were interested in the effects these programs have had on:

- load shifting
- company costs
- investment plans
- company revenues

Of particular interest was information regarding the level of success these programs have had in generating increased consumer demand and increased overall company revenues.

According to the information obtained and data made available it appears that the potential exists for successful implementation of discount programs in increasing overall revenues.

However, the answer to whether or not the particular program will be successful is dependent upon the following variables:

- level of discount
- level of program promotion
- client group involved
- marketing strategy

Some difficulty was encountered in accurately assessing the impact of discount programs. For instance, many of these programs have been in operation for only a very brief period of

time and any assessment of their success is therefore extremely difficult.

In addition in many cases, a particular company was reluctant to divulge confidential marketing information which further hampered any direct assessment. Moreover, multiple price shifts in substitute services and numerous advertising campaigns also tended to obscure customer response analysis.

Despite these constraints, the following key observations are made:

- With proper parameters (i.e., appropriate level of discount for a given market area) discount programs do shift calling to night/weekend periods (off-peak) from peak periods.

An AT&T Optional Calling Plan (OCP) experiment and a New England Telephone Company trial study clearly supports this finding. Off-peak calling for AT&T subscribers, in terms of percentage distribution in long distance calling by time-of-day, increased from 47 per cent to 58 per cent while New England Telephone subscribers showed a 15 per cent switch to off-peak periods.

- In specific market areas the use of discount programs resulted in significantly longer conversation times (i.e., increased consumer demand) which resulted in sizeable increases in long distance revenues.



The increase to AT&T long distance revenues as a result of specific discounts were as great as 117 per cent. Substantial increases in call holding time (revenue) was also observed with the New England Telephone Company subscribers as a result of their discount program.

Customers contributed an average of \$14.06 per month after subscription as compared to \$12.09 per month before subscription.

- It is very clear that the marketing strategy as employed by the company is a critical factor in the outcome of a discount program. Southwestern Bell's recently marketed OCP is a case in point. The company found that the type of consumer attracted to a given plan ultimately determines its success or failure.
- To get business users to shift their calling to off-peak times requires very deep discounts. A shift, if any, is not as immediate or as pronounced with only a moderate price difference. Resistance to change is attributable to basic societal patterns (e.g., typical workday, 5-day work week, etc.).
- Based on the information received by all parties there is no evidence to suggest that incremental costs of capital expenditures can be further decreased with discount programs.

## I. INTRODUCTION

This report discusses the position of a number of U.S. parties regarding discount pricing in telecommunications.

The objectives of this study were to determine the impacts of discount pricing of long distance telecommunications services. In particular, there was interest in the effects discount pricing of Message Toll Services (MTS) and other comparable programs had on rates, load shifting (peak to off-peak)<sup>1</sup>, costs and revenues, investment (capital requirement), and consumer reaction. The results and observations of our research as expressed in this report are more qualitative than quantitative in nature due to the proprietary nature of the required information, but have, nonetheless, proven useful in comparing and assessing similar programs in Canada.

Discount pricing programs have long been viewed as a means of shifting the distribution of telephone calls, decreasing the average unit price for the customer, and increasing long distance revenue for the carrier. However, recent discussions with U.S. Public Utility Commissions, carriers and consumer groups have served to demonstrate the complexity surrounding the achievement of the above goals and of formulating an effective discount pricing policy.

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1 "Off-peak" refers to a time period when there is low demand for telephone calls and hence unused capacity in the system.



The Local Access Transport Areas (LATA), as a result of, divestiture has restricted the Regional Bell Operating Companies (RBOC's) to operations within each LATA, but permits other carriers to provide switched and private line services both within and between LATA regions. This necessitates the reformation of discount plans and rate design structures to meet competition.

Added complexity arises when the traffic management techniques of carriers are analyzed. AT&T has long had automatic routing and traffic management procedures which shift traffic from one main route to another, possibly to a different part of the country, as one route becomes overloaded due to traffic volume or emergency reasons. Local central offices also exhibit different load and busy hour characteristics which further make the use of discount calling difficult.

Many Commissions have, as well, not required specific tracking of the effects of toll discounts by the telephone companies involved. Furthermore, the proliferation and turnover of WATS resellers makes analysis of toll patterns even more difficult because Commissions do not regulate WATS resellers, thereby eliminating important data sources.

For this study, analysis of the available discount programs, including Optional Calling Plans (OCP), was made using the parameters of costs, revenues, pricing equity, load shifts and investment changes. The findings show that the use of average cost has resulted in



inequities and prevented probable shifts from the peak to the off-peak periods; although the overall shift in the Public Switched Network (PSN) hourly load profile is highly dependent on the characteristics of the caller (i.e., business/residential, holding times, etc.) and other usage patterns.

The type of plans in use and their associated impact on network load, included in this study, provide the necessary information to assess the probable success of similar programs in Canada.

The position of the various parties in Section V shows that while Discount Programs may produce immediate benefits for some, there are high costs that must first be met. Technological change, however, is abating the cost concern, in that, new technology is designed to be non-blocking in nature (e.g. fibre optics) thereby eventually defusing the peak/off-peak issue.

AT&T made available a nationwide profile to assist us in evaluating whether time-of-day discounts had any effect on network costs and efficiency. A review of this analysis clearly demonstrates that customers who purchase OCP's respond with longer conversation time in the off-peak period thus improving the efficient use of the telecommunications network. However, there was no evidence to suggest that marginal costs and capital expenditures can be further decreased with time-of-day discounts.

As for the determination of network costs, it is clear that each component of traffic load is to be individually considered. For instance, each market segment needs examination to determine its associated price response. Usage patterns, diversity in load profile, and creation of new peaks, moreover, all contribute to the unit cost of a telephone call.

## II. PURPOSE OF DISCOUNT PROGRAMS

Discount pricing in the U.S. is not new as a generic form of pricing where business loads, served from common plant, vary by time-of-day and by periods of the year. It is used in state and interstate telecommunications toll rates and in other industries' pricing structures, such as transportation carrier tariffs for travel during the evening hours and in the sale of electricity.

Discount pricing is new to the telephone industry, in that, it has not been part of the tariff governing the vast majority of telephone usage, namely local telephone calls placed within the home community.

Regulatory bodies in the fifty states have pursued the use of discount pricing with the telephone industry and other utilities as part of a movement to realign pricing of utility services closer to the economic costs of providing service.

The objectives of Discount Pricing Programs are:

1. to relate charges of calls to the costs of handling the calls
2. to achieve greater pricing equity for customers
3. to provide economic opportunities
4. to shift calls from peak to off-peak
5. to conserve investments and,
6. to increase revenues for the carrier



Discount pricing incorporates the use of off-peak periods or a time period when there is low demand for telephone calls and hence unused capacity in the system is available. Its main economic objective is to price a telephone call on an incremental or marginal cost basis rather than on an average cost basis.

The use of average cost in the telecommunications industry has caused inequities in rate relationships. These inequities, transmit incorrect "pricing signals" to the users of service. High cost users (peak users) continue to generate large peak load demands for service without paying proportionate costs while low cost users (off-peak users) pay higher than necessary charges and possibly restrict their calling needs to compensate for the high rates.

Shifting telephone calls from the peak to the off-peak period is often looked upon as the single most important use of discount pricing. However, discount pricing often serves the role of generating additional revenue. That is to say, discount programs are "employed by telephone companies to entice consumers to augment telephone consumption, and thereby stimulate calling minutes, in a time frame where traffic sensitive costs are very low for the company".<sup>2</sup> These plans have, in fact, been successful in generating additional call volume and generating incremental revenue which help to keep local rates low.

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2 James Lanni, Rates Analyst, Rhode Island Public Utility Commission

### III. TYPES IN USE

There are a number of Discount Pricing Plans presently in use by AT&T, the OCC's and the Regional Bell Operating Companies in the U.S. Many of these plans are identical in nature but go by a variety of names and have somewhat different selling features depending on the targeted market segments.

Apart from the after hours MTS discounts, some of the identified packaged Discount Pricing Plans presently available in a large number of U.S. states are:

- Reach Out Programs
- Home Econ-O-Call Service
- Call Pack
- Dial A Visit
- Wide Area Telephone Service (WATS)

These services are offered as a supplement to basic exchange service and are designed to provide viable discounted alternatives to Message Toll Service to residential customers with moderate to high intraLATA calling interests.

The type of discounts which essentially make up the above plans invariably include one or more of the following parameters:

- Time-of-Day
- Block of Time
- Dollars \$
- Volume of Messages
- Distance

These discount plans, known in the industry as Optional Calling Plans (OCP), are usually based on block of time rates and invariably consist of certain defined calling areas. Their objectives are to provide an alternative set of flexible rate schedules to high volume business and residential customers. These packaged plans, in fact, are usually marketed to the top business and residential customers who generate the bulk of call volume. A Southwestern Bell usage study recently revealed that a small percentage of users account for a large percentage of total calls. In fact a calling survey has shown that 80 per cent of long distance calls are generated by 50 per cent of customers.<sup>3</sup> Furthermore, these plans are specifically designed to bridge the existing price-cost gap and thereby defuse any potential bypass threat.

Where OCP's are offered in the U.S. a significant number of customers view them as providing an opportunity to exercise choice in selecting a pricing option which best suits their long distance calling requirements. A good feature of OCP's is that they require less customer awareness of time of calling, a major drawback of MTS discounts. Surveys have revealed that less than half of a given customer group know precisely when the discount periods begin or end.<sup>4</sup>

Discount programs can be characterized either as those that impact network load or those that produce no load shifting benefits. These programs can be summarized as follows:

- 
- 3 Southwestern Bell's Final Report: Optional Local Calling Plan Trial (October 31, 1984)
  - 4 See Appendix C for the findings of a recent NY Telephone experiment regarding customer awareness.



A. Examples of Discount Pricing Programs that may impact network loads.

1. Change in discount levels for MTS rate periods

In early 1975, AT&T embarked on a program to shift residence calling from day to evening, night and weekend periods. Over a three year period, residential customers responded to increased off-peak discounts and shifted day period calling to the evening rate period.<sup>5</sup> Residential customers' response to night period discounts was limited to brief periods after the 11 p.m. rate change period so as not to interfere with normal sleep patterns.

2. Wide Area Telephone Service

Wide Area Telephone Service (WATS) is usage sensitive by time used, provides for a per cent discount, and is used for outgoing and incoming calls. The WATS rates are based on the subscriber's selected service area(s) the day of the week the calls are made, the hour of the day, and the number of hours a day the service is used. The selected service area(s) may be within the user's home state (intrastate) or out-of-state (interstate). The following explains each of these services. Interstate WATS is (usage/sensitive), based on time-of-day and day-of-week.

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5 Discount Periods:

Night - 11 p.m. to 8 a.m. Sunday-Thursday (60% Discount)  
Weekend - 11 p.m. Friday until 5 p.m. Sunday (60% Discount)  
Evening - 5 p.m. to 11 p.m. Sunday-Friday (40% Discount)

WATS was first introduced by the Bell System in 1961 and appealed to business customers who could queue day period peak calling on dedicated access lines and had a limited need for calling detail. Early WATS call volumes increased approximately 10 per cent annually. By the early 1970's, most major firms had adopted cost center accounting methods measuring financial performance of individual products, service and divisions. Services such as Centrex experienced rapid growth to meet this need. WATS underwent some fundamental changes. Call detail and automatic call routing became available. The incremental costs of volume calling also declined. The following declining block rate is an example of a typical WATS pricing structure.

First 10 hours	\$281.40
Next 35 hours, each hour	\$ 22.30
Next 35 hours, each hour	\$ 7.60
Next 40 hours, each hour	\$ 4.30
Next 120 hours, each hour	\$ 2.00

The fundamental role of WATS changed from a peak load cost control function to a volume promotion plan. Annual WATS call volume growth rates of 15 to 30 per cent or more were realized through the early 1980's and have recently returned to the 10 to 15 per cent range as the service matures and competition increases.

### 3. Dial-It 900 Services

Until recently, 900 Service, was an experimental polling and informational service. Most applica-

tions were restricted to off-peak calling periods to limit or preclude major network busy-hour peak load problems. The 900 Service illustrates an application that could be used to fill in some off-peak periods.

B. Examples of discount programs that may not produce load shifting benefits

1. 800 Service

The 800 Service is an automatic reverse charge service introduced in the mid 1960's. The initial five to seven years after introduction were lack-lustre, with 800 Service annual growth rates of up to 10 per cent. In the early 1970's, business firms began actively seeking ways to stimulate sales and service customers in more efficient ways. Telemarketing became popular, and 800 Service became its primary vehicle. 800 Service has experienced annual growth rates in the 15 per cent - 30 per cent range over the past five years.

As telemarketing matures, 800 Service growth rates are expected to decline.

800 Service was priced on an incremental basis, well above cost. 800 Service traffic was new network traffic and created additional peak day period network loads.

2. Remote Call Forwarding (RCF)

RCF was introduced in the mid 1970's and provided remotely located business firms with a local tele-



phone number and identity. Forwarded calls were rated at MTS day rates, and a premium rate was charged for the forwarding function. RCF is only mentioned here because it offered no price incentive and was not heavily promoted, but rapidly achieved 30 per cent annual growth rates a year after introduction.

### 3. Reach Out America

Reach Out America is a residential promotional program with additional night/weekend pricing incentives and an option to include evening rate periods. As the following table shows, Reach Out America allows customers one hour of interstate long distance calling during the night/weekend discount period for a flat monthly fee of \$10.00. Additional hours of calling in the month are billed at \$8.75 per hour.

Reach Out America is aimed at existing volume discount period residential customers and is intended to stimulate call volumes in off-peak periods.

	<u>APPROVED</u>	<u>FILED</u>
Subscription Fee	\$10.00/Mon.	\$9.40/Mon.
Night/Weekend Allowance	1 Hour	1 Hour
Rate for Additional N/W	\$8.75/Hr	\$8.20/Hr
To Add 15% Evening Discount	\$1.50/Mon.	\$1.40/Mon.

Other characteristics of this OCP include:

- PACKAGED
  - subscription fee
  - block-of-time structure
  - optional features
- VOLUME DISCOUNTED
  - Approximately 15 per cent during off-peak hours
  - large segments of residential market qualifies
- EXPERIMENTALLY DERIVED
  - customers liked the package
  - significant stimulus to increase use
  - profitable

#### 4. Pro-"State" Programs

Modelled after the Pro-America Plan the Pro-"State" Programs grant subscribers a 15 per cent discount on intrastate long distance calls in exchange for a monthly \$25 fee. In order to recoup the \$25 monthly investment, the subscriber needs to make \$167 in long distance calls per month to receive the 15 per cent savings. Clearly this type of program targets heavy residential users and small business users. Twenty-six states have approved Pro-"State" programs.

The Pro-America Plan offered the same incentives to subscribers on interstate calls. However, it was rejected by the FCC on the grounds the service was predatory in nature.

#### IV. SUCCESS/FAILURE OF DISCOUNT PROGRAMS

In many U.S. jurisdictions it is rather difficult to completely evaluate the success/failure of discount programs, due to the length of time some of these programs have been in operation as well as the confidential nature of the information. Telephone companies are reluctant to release data as it might assist a competitor in determining market strategies targeted to specific market segments. Multiple price shifts in substitute services also tend to obscure quantitative customer response analysis. Numerous major advertising campaigns, moreover, make it difficult to analyze data over a period long enough to draw conclusions. However, it is well worth noting that the parameters presently employed to measure the success of a program include:

- Network Costs and Efficiency
- Shift Quantification and Analysis
- Revenue Changes

Positive changes in these variables - increase in total customer usage after subscription (efficiency), usage shift out of peak restricted periods and revenue levels comparable to pre-subscription with no added marketing and promotional costs - would indicate that discount programs are successful and meeting their original design objectives.



### Network Costs and Efficiency

For purposes of identifying demand changes that reflect a more efficient use of the telecommunications network, the following criteria are employed by Dr. Paul E. Green, Professor of Statistics from the University of Pennsylvania, in an independent review of AT&T's optional calling plan experiment.<sup>6</sup>

- Increased conversation length per off-peak call demonstrates improved network efficiency by increasing network utilization during off-peak periods.
- Relatively higher increases in off-peak calling (Night/Weekend) versus peak calling (Day). Significant network capacity exists during the Night/Weekend rate periods. Options that stimulate and/or shift calling to these periods are desirable.

In view of these efficiency criteria, a cost-revenue analysis is employed by the New York New England Exchange (NYNEX), a regional Bell Operating Company. Customer usage both before and after subscription to optional calling plans is recorded. This usage is applied to currently applicable MTS and optional calling plan rates to develop a before and after revenue profile for each service. Customer usage is multiplied by the appropriate unit costs to develop a before and after cost profile for each service. A summary of these costs is displayed in Appendix B-1.

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6 A complete copy of Dr. Green's review of the Optional Calling Plan experiment is annexed to this report as Appendix B.

Results of the study indicate that the use of restricted periods in the rate structure has been successful in shifting usage from the peak network cost periods, creating more efficient utilization of network facilities. This shift, coupled with a stimulation of usage during the qualifying periods is evidence that customers follow the pricing signals of discount services.

Where possible, costs and revenues are assigned to time periods and used to determine the optimum time for discounts. The provisioning and administration of switching machines are based on the individual busy hour of each machine. Therefore, factors such as the cost of measuring equipment, rate structure and charge levels, customer understanding and reaction, and capital savings from shifted calls play a strong role in the viability of a plan.

In general, telephone companies provide sufficient plant and equipment to handle customer demand for local and long distance service in the busiest hour of the average business day, of the relevant busy season, at an appropriate level of service quality. Having done so, no additional facilities are provided to meet traffic loads occurring at other times. All local switching centres and all parts of the long distance network do not experience the same busy hour or busy season. Network management procedures involve reassignment of facilities from time to time in order to accommodate shifting traffic loads, thereby making more efficient use of available equipment. The addition of a small increment of traffic during the peak period for a local switching centre or a segment of the long distance network would likely lead to the need for additional capacity, thereby increasing capital costs, whereas an increase in traffic during off-peak times may

not result in any additional capital cost. In situations where traffic volumes change in both peak and off-peak times it is appropriate to consider the overall effect on total capital costs.

Operating expenses for local services are not highly sensitive to time-of-day. Costs do vary seasonally in some localities when overtime premiums must be paid to plant forces due to increased inward and outward movement of local service. In the case of long distance service, premiums are paid to operators who handle evening and night traffic. Therefore, operating costs per call are higher at times of day when use of capital facilities may be lower.

Another important aspect of network costs is that the cost of a message is not independent of other messages in the network and discounts are only economically justified for off-peak traffic so long as the traffic remains off-peak. An example as provided by John Hopley, Assistant Vice President of NY Telephone, makes this point. Consider a network component where the traffic load profile is highest in the morning, dips at noon, rises in the afternoon, dips at dinnertime, and returns during the evening to a level about 90 per cent of the morning before dropping overnight. Suppose that rates are increased during the day, and reduced in the evening, the result would be a new traffic load profile in which the busy hour has shifted from morning to evening. Under this condition, traffic sensitive equipment previously designed for a morning load will now have to be designed for an evening load. Therefore, evening messages, not morning messages, now cause investment costs to be incurred and discount levels and times require revisioning.



As there is great diversity of component load profiles, the simple shift in traffic volumes described in the above example is a complex issue. This diversity is caused by several factors. One key factor is that business and residential customers exhibit different usage patterns, and the mix of business/residential customers varies widely over the geography served by the Company. Another is that usage patterns within classes of service vary widely. Finally, since some items of telephone plant are sensitive to conversation time and others to call set-up, each component of traffic load must be individually considered. The customer calling characteristics are not only important for cost identification but also for revenue consideration.

Given the above complexities it is difficult, if not impossible, to accurately provide a relationship between costs for peak and off-peak loads.

#### Shift Quantification and Analysis

It is noteworthy to discuss at the outset the perceptions regarding anticipated shifts in traffic patterns due to Discount Pricing Programs. Many advocates of time-of-day pricing pursue the matter with the belief that a shift from peak to off-peak will occur instantly and sizeable costs savings are immediately obtained. What is abundantly clear from our U.S. research, however, is that a shift is almost entirely dependent on the flexibilities of the calling patterns. For instance, data provided to us for a typical business calling pattern reveals that 91 per cent of the business calls are made in the peak period between 8 a.m. and 5 p.m., whereas, nearly half of the residential

calls are made after 5 p.m.<sup>7</sup> This skewed distribution should be kept in mind when projecting the probable success of any discount program, in terms of load shifting.

The following table provides a clear illustration of local weekday calls by major time periods.

<u>DISTRIBUTION OF LOCAL WEEKDAY CALLS BY</u> <u>MAJOR TIME PERIODS (NY STATE)</u>		
		<u>Per cent of</u> <u>Call Volume</u>
Early Morning	8 a.m. - 10 a.m.	12.1
Peak Morning	10 a.m. - 12 p.m.	19.6
Noon Period	12 p.m. - 2 p.m.	15.1
Afternoon	2 p.m. - 5 p.m.	27.6
Early Evening	5 p.m. - 7 p.m.	10.0
Late Evening	7 p.m. - 9 p.m.	8.0
Night	9 p.m. - 11 p.m.	4.2
Late Night	11 p.m. - 8 a.m.	3.4
		<u>100.00</u>

The Southern New England Telephone Company conducted an experimental six month trial promotion of four OCP's for message telecommunications service to encourage subscribers to maximize their off-peak calling and promote network efficiency.

For a \$25 monthly fee, business customers, under the New Haven Business Plan, obtained a 35 per cent discount on toll calls placed during the following special hours:

8 a.m. - 9 a.m.	Monday through Friday
12 noon - 2 p.m.	Monday through Friday
4 p.m. - 5 p.m.	Monday through Friday

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7 See Appendix C for a Time of Day load profile and associated cost of calls, as provided by NY Telephone

For a \$3 monthly fee, residential customers, under the New Haven Residence Plan, obtained a 60 per cent discount on toll calls placed during the following specified hours:

8 a.m. - 9 a.m.	Monday through Friday
9 p.m. - 11 p.m.	Monday through Friday
8 p.m. - 11 p.m.	Monday through Friday

The result of this study indicates that there was minimal impact on local shifting.

Similarly a six month usage study of consumers by Southwestern Bell before and after they started using an optional calling plan also indicates minimal impact on load shifting. As the following table shows, there was some increase at night and decrease in day calls after the consumers changed to the OCP.

DAY-EVENING NIGHT DISTRIBUTIONS OF MESSAGES AND MINUTES OF 208 CUSTOMERS				
		Day	Eve.	Night
Before OCP (Dec.'82)	MSG	45	30	25
	MIN	42	35	23
	MIN/MSG	3.88	4.77	3.80
After OCP (June '83)	MSG	41	29	29
	MIN	39	37	24
	MIN/MSG	3.73	4.98	3.37

It is the U.S. Federal Communications Commission observation based on AT&T's experience that a load curve shift is only possible with very deep discounts for off-peak periods. Otherwise a shift is not immediate or pronounced with a moderate price difference.<sup>8</sup> A significant point, in terms of call distribution, is that

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8 Peyton L. Wynns: Federal Communications Commission



residential, unlike business, calling is relatively cross-elastic or flexible between hours and days in which calling takes place, although a significant number of residential calls made during the peak period are also to businesses and therefore not substitutable. The general stability of the peak hour at the weekday before noon time suggests that basic societal patterns (e.g. typical workday, 5 day work-week, etc.) limit the impact that rate incentives have on the call traffic distribution. Moreover, structural factors such as different load and busy hour characteristics for local central offices, and non-coincident peaks for different switching machines further limit whatever impact rate incentives might have.

A 1982 AT&T analysis of the public switched network (PSN) load shows no statistically significant change in the overall time-of-day load distribution following a change in the time-of-day rate structure. There was no noticeable variation in the PSN peak hour usage (11 a.m. to 12 noon EST), expressed as a per cent of total day traffic load. However, some change was observed in the load profile in the afternoon and evening for the total PSN, the per cent of load in the afternoon and evening increased relative to day usage.<sup>9</sup> It is clear that the combined residential advertising campaigns, aimed at moving calls to discount periods, and increased MTS discounts did move residential calling to MTS discount periods. The major shifts in business calling are caused by a combination of pricing plans, changes in technology, and changes in business practices such as telemarketing and cost center accounting.

### Revenue Changes

The revenue changes associated with time-of-day pricing play a controlling role in the degree and speed of implementation of discount programs. When such programs are used, the resulting change in revenue is weighted against the expected benefits of such pricing. All telephone companies interviewed recognize the significant contribution which is made by calls in the normal business day period to the revenue requirement, and the sensitivity of system peaks to the different pricing strategies.

As the following NY Telephone statistics show, the bulk of carrier revenues are generated in 8 a.m. - 9 p.m. peak period with less than 20 per cent being generated in the off-peak periods. Any price change, therefore, would have a significant impact on carrier revenues.

<u>DISTRIBUTION OF CALL REVENUES</u>	
<u>Period</u>	<u>Per cent</u>
Peak 8 a.m. - 9 p.m.	82%
Shoulder 9 p.m. - 11 p.m.	16%
Off-Peak 11 p.m. - 8 a.m.	2%

In recognition of this revenue distribution, carriers are less willing to initiate load curve changes, with enhanced discount programs, which may have detrimental revenue implications. Market trials are invariably taken to ascertain the revenue implications, as will be seen below. According to Philip Shapiro of the New York Consumer Protection Board, it is difficult to determine the success of a discount program with respect to revenues.

Revenue and cost information, in most cases, are not made available. AT&T, like other common carriers considers information of this nature to be confidential and proprietary. AT&T Communications, in fact, does not maintain state specific information and is reluctant to give regional information due to the competitive environment in which it finds itself.

A New England Telephone revenue study which was made available however, shows that customers are contributing more revenues on average, per month with an OCP than they would have contributed on average with MTS. The table below shows the comparative statistics. The contribution levels under MTS and the OCP (Circle Calling Service) were determined by combining all of the costs associated with total usage and subtracting them from the corresponding revenues. The results show that with MTS (prior to subscription) each customer would have contributed an average of \$12.09 per month under today's rates. Currently, as a OCP subscriber, each is contributing an average of \$14.06 per month.

<u>CIRCLE CALLING SERVICE</u> <u>COMPARATIVE ECONOMIC ANALYSIS</u>			
<u>PER CUSOMER BASIS</u>			
<u>Before Subscription</u> <u>(MTS)</u>		<u>After Subscription</u> <u>(Circle Calling Service)</u>	
		Monthly Rate	\$11.25
		Overtime	4.23
		Restricted Periods (MTS)	6.40
Revenue	\$19.47	Total Revenue	\$21.88
Cost	<u>7.38</u>	Cost	<u>7.82</u>
Contribution	\$12.09	Contribution	\$14.06



In contrast, Southwestern Bell recently discovered revenue losses with a recently marketed OLCP (Optional Local Calling Plan). In fact the amount of revenue loss was a function of the number of OLCP customers, the usage revenue generated by the customers, and the dollar difference between the fixed charge of the OCP and previous charges. Southwestern Bell found that while usage revenue can be the dominant factor affecting the revenue loss, generally the type of consumer attracted to the plan is the dominant factor. For the 14 months which the per cent of market penetration increased 13 of these months had an increase in the revenue loss to the company.<sup>10</sup> This revenue loss arose when too many low cost causing consumers changed to OLCP and thus no longer subsidized the high cost users.

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10 See Appendix B-2 for a plot of annualized revenue loss per month

V. POSITION OF VARIOUS PARTIES REGARDING DISCOUNT PRICING PROGRAMS

The responses of the various U.S. parties contacted regarding discount pricing programs were surprisingly varied. The New York Telephone Company, the New York State Public Service Commission and the Florida Public Service Commission have been on the forefront of discount pricing efforts and have made significant progress with various plans. For the other telcos, Commissions and consumer groups, it was generally felt that further progress can be made promoting greater shift in calling patterns in their respective jurisdictions.

Two major stumbling blocks identified for some of the Bell Operating Companies and other common carriers were marketing and capital costs. Time of day discount programs rely heavily on measuring equipment which have a fixed cost associated with them. There is virtually no diminished investment need associated with off-peak calling (i.e., no capital savings effect). Moreover, the present FCC access charges, which are not time-of-day sensitive, further eliminate any existing cost flexibilities.

With regard to marketing and promotion, it was felt that more could be done to effectively encourage subscribers to take advantage of discount offerings. The switch to equal access does pose a significant problem to the OCC's in that conversion to equal access is occurring on a switching station by switching station basis. Modern forms of promotion and advertising do not conform to the many boundaries of the network structure, making it extremely difficult to inform customers of discount services over the transition period.

### New York Consumer Protection Board

Tariq Niazi of the NY Consumer Protection Board maintains that technology is eliminating the concerns of time-of-day capital costs, in that, the technology being installed today is designed to be non-blocking in peak load periods (i.e., fibre optics).

The introduction of this technology, according to Niazi, has not been for the purpose of adding capacity to meet peak demands, but to accommodate enhanced features, such as high speed data transmission. Added capacity is simply a by-product. Over time as conversion to the new technology accelerates the economics of time-of-day discount will become a non-issue.

### New York Telephone

In New York Tel's case, the measuring equipment has been bought and installed, and a peak load pricing system is in effect. What remains is a close study to ascertain whether customers will actually shift calls into the shoulder and off-peak periods to a greater extent, and whether future growth can be channeled to these periods, without damaging usage revenues. New York Telephone intends to do so by moving into a two tier pricing structure from a present three tier structure, once the New York Public Service Commission deliberates on a present hearing. According to John Hopley of New York Telephone this proposed schedule puts the company in a "divested mode". In other words, a two tier discount structure brings rates closer to costs. The eventual elimination of the shoulder period narrows the gap between

rates and costs. However, strictly in terms of costs "there is no evidence to suggest that marginal costs can be further decreased, with time-of-day discounts".<sup>11</sup>

#### OTHER DISCOUNT PRICING POSITIONS IDENTIFIED

##### Florida Public Service Commission

Discount pricing for both MTS and WATS are already in place in Florida and have been since 1963. As well, the optional calling program "Reach Out Florida" which provides for a discounted hour of interLATA toll calling during the night/weekend period is also available.

In the ongoing dockets on access charges the Commission recently approved time-of-day sensitive rates for access charges paid by long distance providers to the local exchange companies. As a result of this, the Commission expects that more off-peak pricing options will become available by long distance providers.

The Commission has an ongoing monitoring program and will make 1985 information available in 1986. This would make it possible to compare call distribution.

##### AT&T

AT&T has become more price sensitive as a result of competition. It is well aware that economic efficiency may be served by rates that change load curves, however, according to AT&T's Michael Murphy "it is not in our best

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11 John Hopley, Assistant Vice President, New York Telephone, New York, N.Y.



interest to lower prices on a broad scale at this time. There is a recognized loss in profitability as a result of positive elasticity of demand estimates". The company therefore, has experimented with Optional Calling Plans involving 15 different rate schedules.

AT&T has had some experience in estimating the results of these plans, but research findings, combined with the current best estimates of price responsiveness, has not yielded sufficient data to support permanent filings of some or all of the plans.

The Optional Calling Plans experiment, however, suggests that a significant number of customers view Optional Calling Plans as an opportunity to minimize long distance charges, make longer calls, and have more control over their bill.

For AT&T, demand stimulated by Optional Calling Plans occurs on the network in a way that improves network efficiency. Relatively higher increases in off-peak calling (Night/Weekend) versus peak calling (Day) has to date materialized.<sup>12</sup>

In 1982, AT&T conducted an analysis of the Public Switched Network (PSN) load following a WATS time-of-day rate change. Comparison of the load distribution profiles, before and after WATS time-of-day rate structure change, was made to evaluate the overall effect of a WATS time-of-day rate change on the PSN load.

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12 See Appendix B for analysis of AT&T's findings on Network Costs and Efficiency.

Total industry interstate holding time, in minutes, by time-of-day was selected as the best measure of the impact of the nationwide WATS rates on peak usage of the nationwide network. No significant shifting of the WATS load was detected in this peak usage study (indicating the locked in pattern of calling).

The load distribution usage data was provided for the following three services that use the PSN: MTS, 800 Service, and Outward WATS. The Outward WATS and 800 Service traffic loads grew at positive rates and MTS at a negative rate. WATS continued to be an increasing portion of the total PSN and peak hour loads.

For the composite load in the PSN, the per cent of total-day load occurring in the peak hour did not change when compared with the pre-experiment data. Moreover, no increase in the overall PSN peak hour load was observed. Therefore no statistically significant load difference could be directly attributed to a WATS time-of-day rate structure change.

#### Pennsylvania Public Utility Commission

The Pennsylvania Public Utility Commission is typical of PUC's across the U.S. in that it is very interested in plans or programs which encourage off-peak calling and have, in fact, approved a number of OCP's. However, the Commission does not have any sophisticated, statistical, mathematical model type of studies or computer programs which attempt to evaluate the precise effect on the amount of traffic which would be shifted due to a given rate increase or decrease on an associated time-of-day.

According to Don Birx, Director of the Rates Office of the Commission, the federal Modified Final Judgement divested AT&T from the Bell Operating Companies and more firmly opened the interstate toll market to competition. The Commission has endorsed competition generally and has usually approved the filings of the various long distance carriers, some of which are designed to secure optimum revenue with minimum investment by various volume and time-of-day discount programs.

#### CONSUMER GROUPS

Consumer groups generally view Long Distance Discount Plans as vehicles that provide consumers with a choice, minimize their long distance charges and help them gain more control over the monthly bill. Optional Calling Plans are regarded as a lower priced alternative that offer greater customer awareness. The Michigan and Florida Consumer Councils both expressed a desire to see these programs provided on a universal, rather than on an ad hoc, basis. New technology adds impetus to this universality argument, although it was generally felt that carriers need to step up their promotion campaigns to generate the required universality results and make the services more understandable. In many cases "programs are judged to be too complex for customers, and in some instances, for company sales people".<sup>13</sup>

Furthermore, many companies are noted as being unwilling to introduce new services which, if properly marketed, would prove highly attractive to residential subscribers. Some carriers are viewed as having poor

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13 Charles Beck: Intervenor Attorney, Florida Office of Public Counsel (Tallahassee, Florida)

track records on services presently offered. This reinforced the concern that discount plans are neither promoted to their fullest extent possible nor designed to attract many customers. In fact, it is argued that any simplification of the existing tariff schedules would make promotion easier and aid customer understanding.



## VI. CONCLUSIONS

After examining the U.S. time-of-day discount programs and their associated traffic load, costs, revenues and investment needs, the following conclusions can be drawn:

- With proper parameters (i.e., appropriate level of discount for a given market area) discount programs do shift calling to night/weekend periods (off-peak) from peak periods.

An AT&T Optional Calling Plan (OCP) experiment and a New England Telephone Company trial study clearly supports this finding. Off-peak calling for AT&T subscribers, in terms of percentage distribution in long distance calling by time-of-day, increased from 47 per cent to 58 per cent while New England Telephone subscribers showed a 15 per cent switch to off-peak periods.

- In specific market areas the use of discount programs resulted in significantly longer conversation times (i.e., increased consumer demand) which resulted in sizeable increases in long distance revenues.

The increase to AT&T long distance revenues as a result of specific discounts were as great as 117 per cent. Substantial increases in call holding time (revenue) was also observed with the New England Telephone Company subscribers as a result of their discount program.

Customers contributed an average of \$14.06 per month after subscription as compared to \$12.09 per month before subscription.

- It is very clear that the marketing strategy as employed by the company is a critical factor in the outcome of a discount program. Southwestern Bell's recently marketed OCP is a case in point. The company found that the type of consumer attracted to a given plan ultimately determines its success or failure.
- To get business users to shift their calling to off-peak times requires very deep discounts. A shift, if any, is not as immediate or as pronounced with only a moderate price difference. Resistance to change is attributable to basic societal patterns (e.g., typical workday, 5-day work week, etc.).
- Based on the information received by all parties there is no evidence to suggest that incremental costs of capital expenditures can be further decreased with discount programs.
- While Discount Programs may produce immediate benefits for some, there are high costs that must first be met (i.e., metering equipment etc.)
- Technological change is abating the cost concern, in that new technology is designed for much greater capacity (i.e., fibre optics) and therefore eliminate the peak/off-peak issue.

- With the exception of the standard time-of-day and day of week discounts the majority of the remaining long distance discount programs require a customer to have certain minimum volume of calling in order to take economic advantage of the lower prices offered.
- Many discount programs are targeted to specific locations and are only available to customers within those locations.
- Further progress can be made in promoting long distance discount programs and shifting calls out of the business day period.
- New technology is quickly dissipating the peak/off-peak issue when the use of non-blocking transmission medium such as fibre optics becomes widespread.
- More long distance discounts programs will become available as new technology comes on stream.
- Many time-of-day discounts are hard to understand and should be simplified.

APPENDIX A

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APPENDIX B

AT&T's FINDINGS ON NETWORK COSTS AND EFFICIENCY

AT&T's Optional Calling Plan experiment commenced on July 1, 1983 and terminated on December 31, 1983. The experiment was designed to properly quantify customer purchase and usage decisions and to analyze the effect of the demand charges in terms of network costs and efficiency. The following are the major findings and conclusions.

Network Costs and Efficiency

Options that stimulate and/or shift calling to night/weekend periods are desirable in that they more efficiently utilize the network and help control network costs.

An AT&T experiment resulted in the following observations.

<u>AVERAGE CONVERSATION LENGTH</u>		
<u>Customer Usage Segment</u>	<u>% Purchasers</u>	<u>Percentage Change in Conversation Length During the Experiment</u>
Up to 120 Minutes	69.3	22.7
Over 120 Minutes	30.7	5.5

A review of the above analysis clearly demonstrates that customers who purchase Optional Calling Plans respond with longer conversation times, thus improving the efficient use of the telecommunications network.



APPENDIX B cont'd

Turning our attention now to changes in long distance calling demand by time-of-day, AT&T observed the following in the trial population:

<u>CHANGES IN TIME-OF-DAY DISTRIBUTIONS</u>		
<u>Total Minutes of Use</u>	<u>% Distribution Prior to Purchase</u>	<u>% Distribution after Purchase</u>
Day	13.1	9.5
Evening	40.2	33.0
Night/Weekend	46.7	57.5
	<u>100.0</u>	<u>100.0</u>

This dramatic improvement in network utilization during off-peak periods, combined with significantly longer conversation times, supports the conclusion that properly designed Optional Calling Plans can be expected to yield improved network efficiencies.

Revenue Analysis

The revenue analysis for the market trial was developed by comparing Interstate Long Distance revenues for the month preceding purchase of the Optional Calling Plan with the months following purchase.

The following table contains the results of this analysis:

<u>CHANGES IN DDD LONG DISTANCE REVENUES</u>	
<u>Total Minutes of Use</u>	<u>% Change in Customer Bill (LD Revenues Dur- ing the Experiment)</u>
Up to 120 Minutes	116.9
Over 120 Minutes	17.5

The above results clearly demonstrate that customer response to Optional Calling Plans in the trial areas resulted in a significant increase in long distance revenues.

APPENDIX B-1

The following study of cost comparisons are provided by the New England Telephone Company. Customers toll usage before subscription are compared with usage after optional calling plan subscription.

<u>OPTIONAL CALLING PLAN COSTS</u> <u>1985 ANALYSIS</u>		
<u>Circle Calling Service</u>		
	<u>Pretrial/MTS</u>	<u>Trial/OCP</u>
Cost per customer	\$ 7.38	7.82
Cost per minute	\$ .0660	\$ .0515
Cost per message	\$ .3261	\$ .2782
Average holding time	4.9420	5.4003
Messages per customer	22.6446	28.0964
 <u>Pine Tree State Service</u>		
	<u>Pretrial/MTS</u>	<u>Trial/OCP</u>
Cost per customer	\$ 9.56	10.26
Cost per minute	\$ .0689	\$ .0551
Cost per message	\$ .4802	\$ .3966
Average holding time	6.9742	7.1958
Messages per customer	19.9100	25.8687

Circle Calling Service allows residential customers to place two hours of directly dialed intraLATA toll calls for \$11.25 per month. Calls made under the plan must be placed between the hours of noon and 6 p.m., and between 9 p.m. and 9 a.m. on weekdays, and all hours on weekends and certain holidays. Calls made during other time periods are billed at applicable MTS rates.

APPENDIX B-1 cont'd

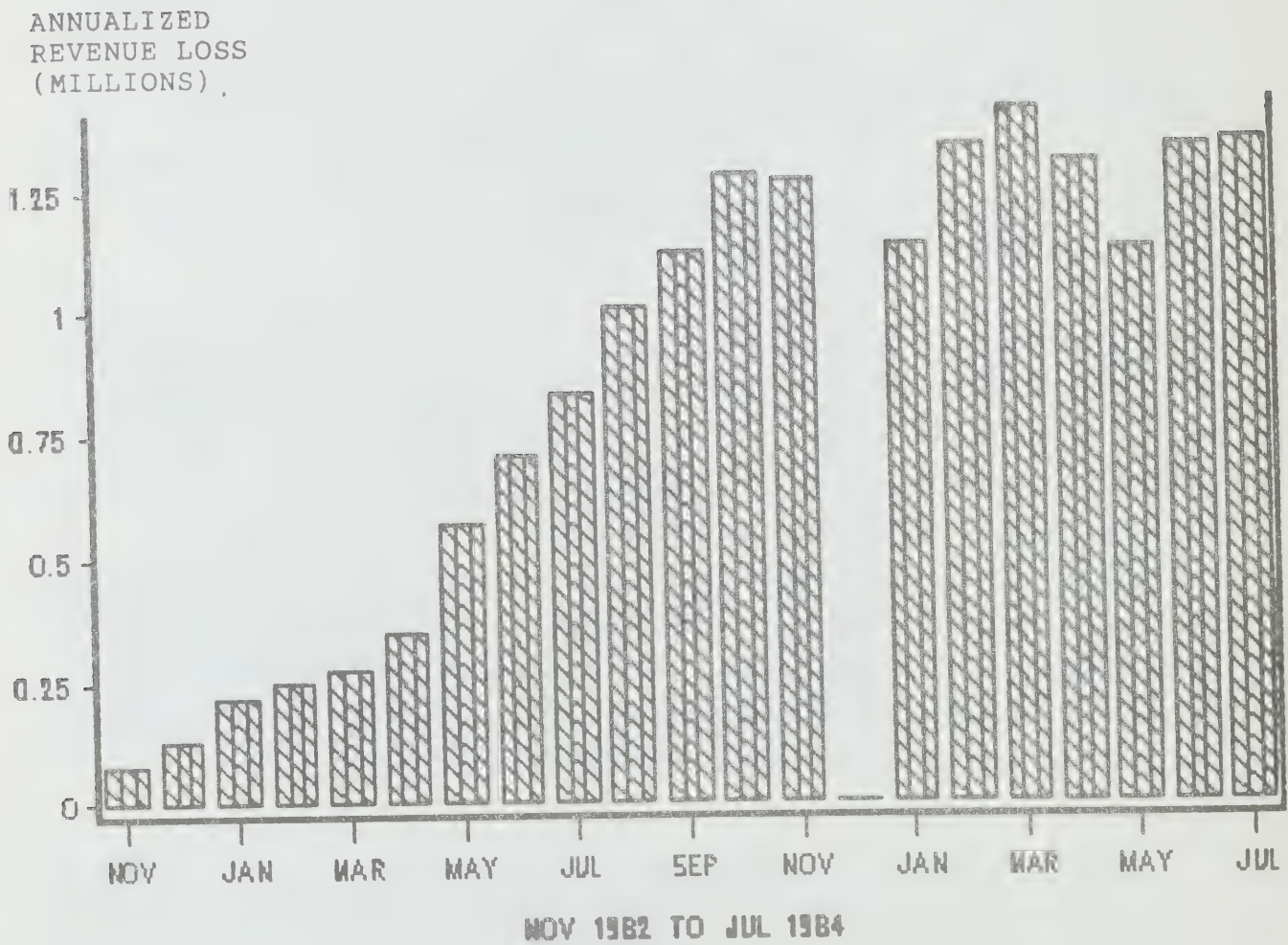
Inclusion of the two weekday restricted periods, 9 a.m. to 12 noon and 6 p.m. to 9 p.m., is to encourage shift out of these peak periods. Comparing customers' minutes of use prior to subscription with total minutes of use after shows a reduction of 10 per cent in the morning restricted period and 28 per cent in the evening restricted period. Prior to subscription, customers' MTS usage during the two restricted periods represents 37 per cent of their total usage. After the switch to Circle Calling Service, MTS usage during the restricted periods represents only 22 per cent of total.

In addition to reducing total minutes during the restricted periods, customers also reduce the length of their conversation. During the weekday morning restricted period, holding times are reduced from 4.79 minutes per message to 4.42 minutes per message. During the weekday evening restricted period, customers on average reduce holding times from 6.36 minutes per message to 5.52 minutes per message. Holding times during the qualifying period increases. These changes are evidence that the pricing signals are modifying calling behaviour and leading to a more efficient utilization of network facilities.

APPENDIX B-2

LOSS IN RECURRING REVENUE DUE TO OLCP

(Southwestern Bell)





APPENDIX C

The following data are taken from surveys which NY Telephone prepared in connection with proposed rate structure changes including time-of-day.

WHETHER AWARE OF DAYS/TIMES WHEN LOCAL  
USAGE CALLS ARE REDUCED

Q. Do you happen to know if there are any particular hours or days of the week when the rates for calls charged as local usage calls, formerly message unit calls, are reduced?

	NOV. 1980	APRIL 1981	MAY 1982	NOV. 1983	DEC. 1984
BASE: Downstate Customers	(538)	(523)	(531)	(532)	(526)
	%	%	%	%	%
Aware of reduced rate hours	39	32	33	77	80
Not aware	61	68	67	23	14
Don't know	-	-	-	-	6

APPENDIX C cont'd

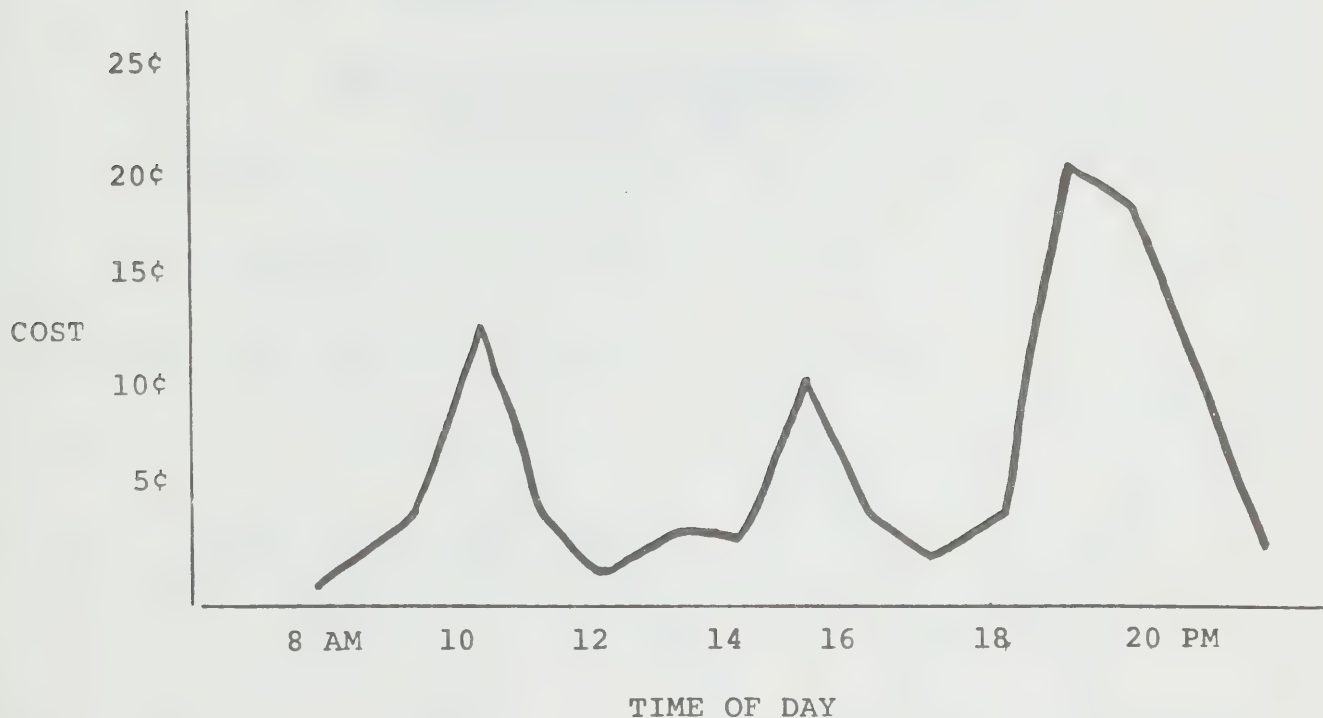
PER CENT SAVED ON LOCAL USAGE CALLS DURING  
DISCOUNT PERIODS

- Q. How much cheaper do you think it is to call on a weekday between 9 p.m. and 11 p.m. than during the daytime? Do you think the cost is 10%, 25%, 35%, 40%, 50%, 60%, or 75% less?
- Q. How much cheaper do you think it is to call after 11 p.m. on weekday or all day on the weekend until 5 p.m. Sunday than to call Monday through Friday during the daytime?

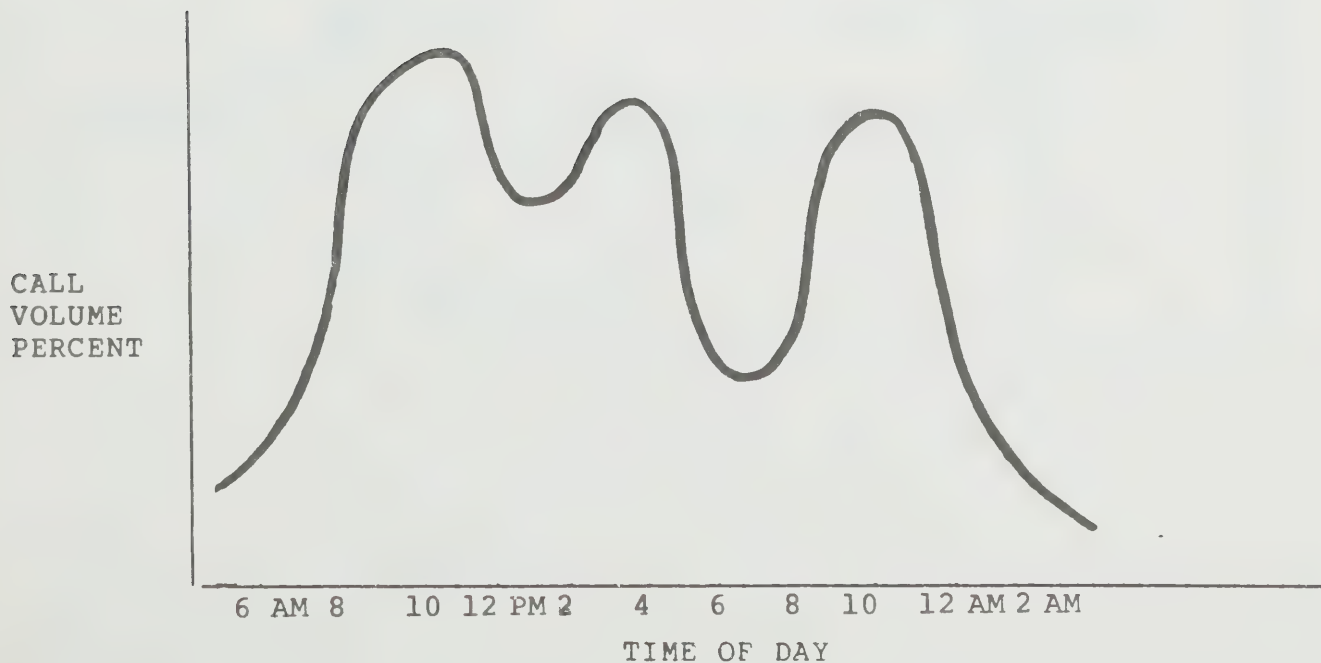
	NOV. 1983 (532) %	DEC. 1984 (526) %
BASE: Downstate Customers		
<u>Weekday Evenings (9-11 p.m.)</u>		
10%	19	21
25%	27	29
Correct (35%)	26	27
40%	12	10
50%	9	9
60%	5	4
75%	2	*
<u>Weekends/Weeknights</u>		
10%	10	9
25%	21	20
35%	11	16
40%	13	15
50%	20	18
Correct (60%)	19	19
75%	6	6
*Less than 0.5%		

APPENDIX C cont'd

COST OF CALL BY TIME-OF-DAY

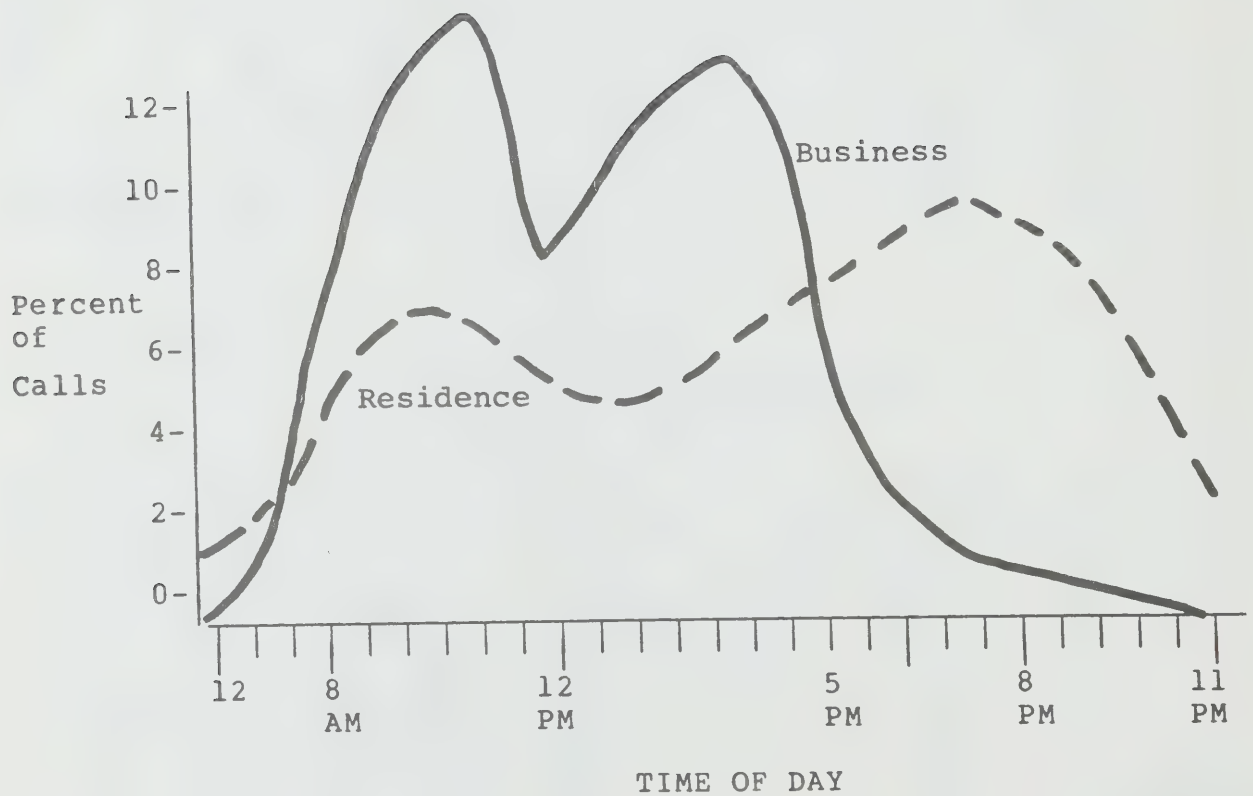


GRAPHICAL REPRESENTATION OF LOCAL  
TELEPHONE CALLS BY TIME OF DAY



APPENDIX C cont'd

DISTRIBUTION OF CALL VOLUME  
(BY TIME-OF-DAY)





APPENDIX C cont'd

<u>DISTRIBUTION OF CALLS BETWEEN RESIDENCE AND BUSINESS CUSTOMERS</u>		
	<u>Per cent Distribution</u>	
	<u>Residence</u>	<u>Business</u>
Peak		
8 a.m. - 9 p.m.	62	91
Shoulder		
9 p.m. - 11 p.m.	32	7
Off-Peak		
11 p.m. - 8 a.m.	6	2
	<u>100</u>	<u>100</u>
TOTAL CALLS	2.9	3.1
	billion	billion
Shoulder Period		
All Hours on Saturday and Sunday		

<u>COST OF LOCAL CALLS BY THE TIME-OF-DAY</u>	
<u>Time Period</u>	<u>Per cent of Day Peak</u>
Day	
(8 a.m. - 9 p.m.)	100
Evening	
(9 p.m. - 11 p.m.)	32
Night	
(11 p.m. - 8 a.m.)	29

APPENDIX C cont'd

<u>COSTS OF SINGLE MESSAGE UNIT</u> <u>TELEPHONE CALL DURING PEAK,</u> <u>SHOULDER AND OFF-PEAK PERIODS*</u>			
	<u>Setup</u> <u>Switch</u>	<u>Per</u> <u>Minute</u>	<u>Five Minute</u> <u>Call</u>
Peak 8 a.m. - 9 p.m.	4.5¢	0.4¢	6.5¢
Shoulder 9 p.m. - 11 p.m.	3.2	0.2	4.4
Off-Peak 11 p.m. - 8 a.m.	3.1	0.2	4.0
Average Cost of Call throughout 24 hour day		5.8¢	
*Represents 1976 Data			



